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**ASSIGNMENT BOOKLET**
SCN3260 Physics 30
Module 4 Assignment

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- Are all the assignments completed? If not, explain why.
- Has your work been reread to ensure accuracy in spelling and details?
- Is the booklet cover filled out and the correct module label attached?

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# Physics 30

LearnEveryWare

we explore

## Magnetic and Electric Fields in Nature and Technology

## Module 4

## Assignment Booklet

Rocky View School Division

Red Deer Catholic Regional Schools

Pembina Hills

Edmonton Public Schools

Black Gold Regional Schools

Peace Wapiti School Division No. 76

Calgary Board of Education

Alberta Education

## FOR TEACHER'S USE ONLY

### Summary

|  | Total Possible Marks | Your Mark |
|---|---|---|
| Lesson 1 Assignment | 30 |  |
| Lesson 2 Assignment | 30 |  |
| Lesson 3 Assignment | 27 |  |
|  | 87 |  |

### Teacher's Comments

Physics 30 Learn EveryWare
Module 4: Magnetic and Electric Fields in Nature and Technology
Assignment Booklet
ISBN 978-0-7741-3203-9

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# MODULE 4 ASSIGNMENT BOOKLET

## Module 4: Lesson 1 Assignment

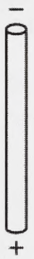
This Module 4: Lesson 1 Assignment is worth 30 marks. The value of each assignment and each question is stated in the left margin.

**(30 marks)**

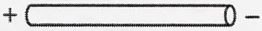
## Lesson 1 Assignment: Magnetic Fields

**(5 marks)** **A 1.** Using the diagrams below, indicate the direction of the magnetic field associated with the wire when the current is flowing in the direction indicated. (Electron current flows from negative to positive.)

a.



b.



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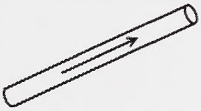

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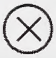
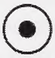
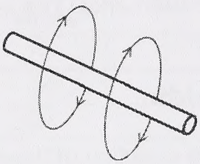


e.



**(3 marks)** **A 2.** Using the diagrams below, indicate the direction of electron flow if the associated magnetic field is in the direction indicated.

b.



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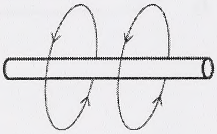

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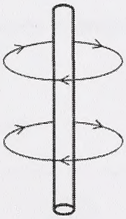
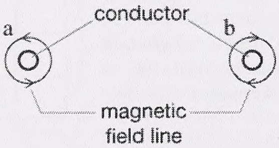
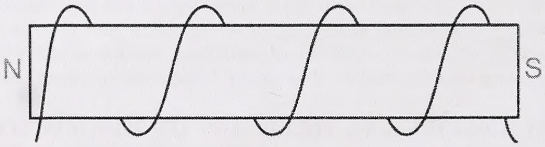


**(2 marks)** **A 3.** Given the diagrams below indicate whether a dot or an "x" should be placed in each circle. (Note that current is the direction of the electrons, e- flow.)



**(6 marks)** **A 4.** Given the diagrams below, indicate the path of the current (e- flow) that produces magnetic poles as indicated.

a.



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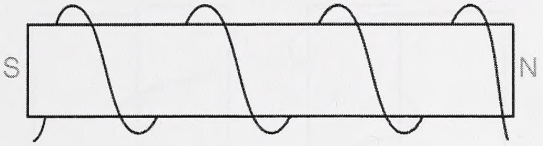

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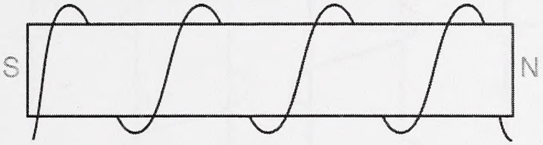
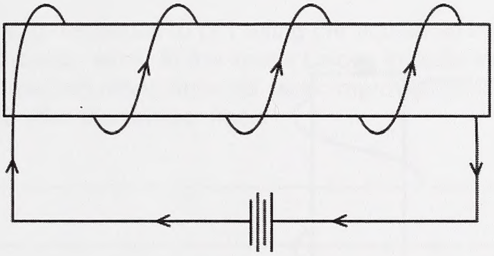
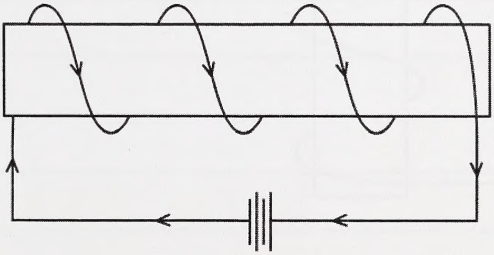


**(10 marks)** **A 5.** Given the diagrams below, indicate the direction of the magnetic field created by the current (e- flow) flowing through the solenoid.

a.



b.



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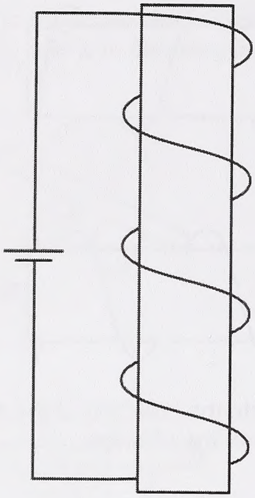

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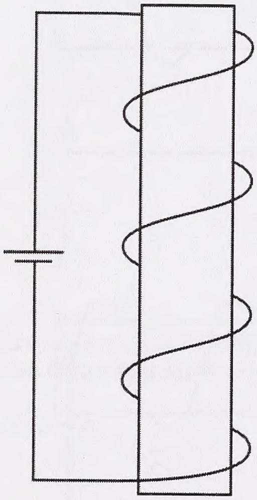
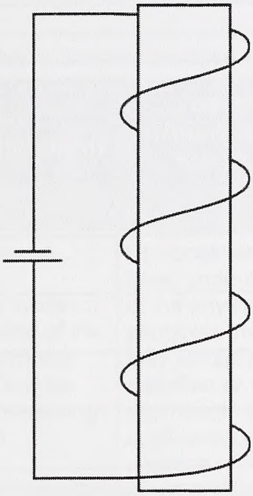


e.



**(4 marks)** **D 3.** Revise your response to D 1 using the additional information from your readings of other students' work. In the space below, include your final response and comment on how reading other students' work improved your own. A scoring guide is provided after the answer lines.

**There are more lines on the following page.**

## DISCUSSION SCORING GUIDE

<table>
<tr><td colspan="5">Principles involved: magnetic fields, charged particles in a magnetic field</td></tr>
<tr><th>Criteria</th><th>Level 1 (Below Standard)</th><th>Level 2 (Approaching Standard)</th><th>Level 3 (Standard)</th><th>Level 4 (Above Standard)</th></tr>
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</table>

## Module 4: Lesson 2 Assignment

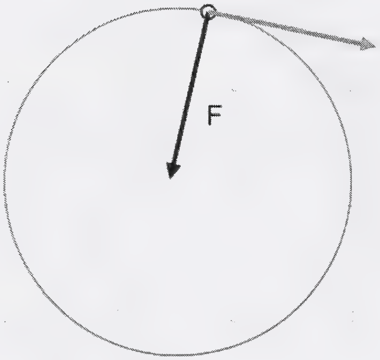
This Assignment Booklet is worth 30 marks. The value of each assignment and each question is stated in the left margin.

**(30 marks)**

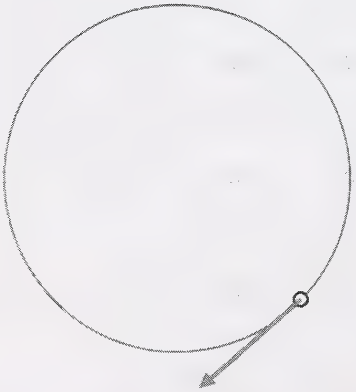
## Lesson 2 Assignment: Moving Charges in Magnetic Fields

**(4 marks)** **A 1.** As a review, draw the inward force on the following diagrams. The first one has been completed as an example.

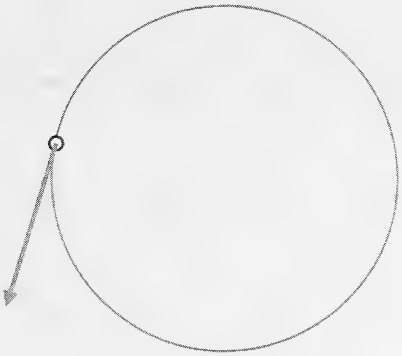
a.



b.

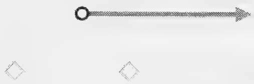


c.

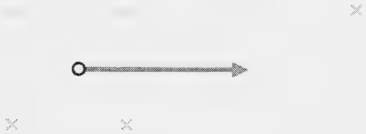


**(8 marks)** **A 2.** Predict, draw, and verify the magnetic force on each diagram below. Verify your answers using the simulation.

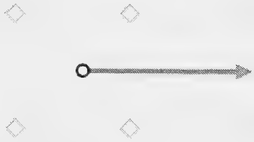
a. positive charge



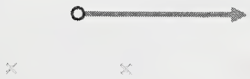
b. positive charge



c. negative charge



d. negative charge



**(4 marks)** **A 3.** An electron experiences a downward magnetic force of $7.15 \times 10^{-14}$ N when it is travelling at $3.00 \times 10^{5}$ m/s south through a magnetic field. Calculate the magnitude of the magnetic field and determine its direction using the right-hand rule.

**(3 marks)** **A 4.** A charged particle is travelling west through a downward magnetic field and it experiences a magnetic force directed to the north. Using the hand rule, determine whether the charge is negative or positive.

**(4 marks)** **A 5.** Calculate the magnitude and the direction of the magnetic force acting on an alpha particle that is travelling upwards at a speed of $3.00 \times 10^{5}$ m/s through a 0.525-T west magnetic field.

**(3 marks)** **A 6.** An electron ($m = 9.11 \times 10^{-31}$ kg) enters a downward magnetic field of $5.00 \times 10^{-1}$ T with a velocity of $6.50 \times 10^{6}$ m/s West. Calculate the radius of the circular path it will follow once it is travelling within the magnetic field.

**(4 marks)** **D 3.** Revise your responses to D 1. In the space below, include your final response and comment on how reading other students' work improved your own. A scoring guide is provided after the answer lines.

**There are more lines on the following page.**

## DISCUSSION SCORING GUIDE

Principles involved: Thomson's charge-to-mass ratio experiment

| Criteria | Level 1 (Below Standard) | Level 2 (Approaching Standard) | Level 3 (Standard) | Level 4 (Above Standard) |
|---|---|---|---|---|
| **Knowledge** | | | | |
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**(27 marks)**

## Module 4: Lesson 3 Assignment

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## Lesson 3 Assignment: Electromagnetic Induction

**A 1.** A compact fluorescent light bulb draws a current of 0.10 A for one hour.

**(2 marks)** a. How much charge flows through the bulb in one hour?

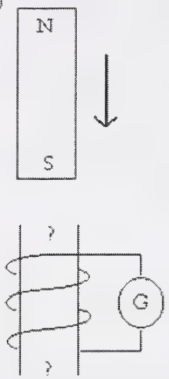
**(2 marks)** b. How many electrons flow through the light bulb in the hour? Remember the charge of one electron is the elementary charge on your physics data sheet.

**(2 marks)** **A 2.** A motor uses a coil of wire in a magnetic field to generate force. The motor draws a current of 9.50 A through the coil of wire and has a magnetic field of 1.75 T. If the motor is designed to generate 800 N, how long is the wire in the coil, assuming that all of the wire creates force?

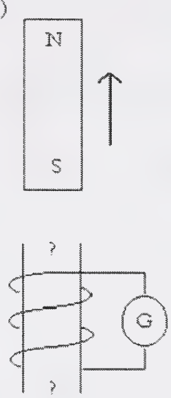
**(2 marks)** **A 3.** What would happen to the direction of the magnetic force if the loop of wire were to undergo one half-turn without reversing the direction of the current in the loop?

**(6 marks)** **A 4.** Fill in the "?" with the missing information in each of the following diagrams. In the diagrams a magnet is either dropped down or pulled up through a cylinder encircled by a coil conductor. Remember that current is e$^-$ flow.

a)



b)



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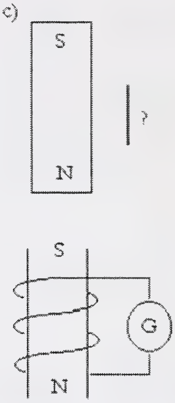

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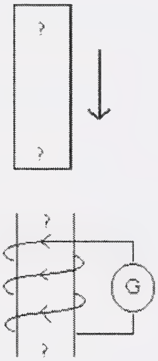

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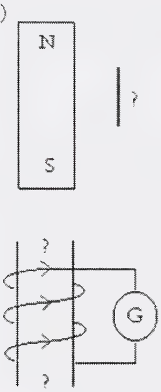

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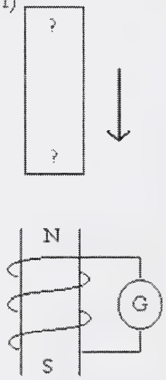

**(1 mark)** **LAB 1.** “Pickup” coil: how does the direction of the movement of the magnet affect the direction of the deflection on the voltage meter?

**(1 mark)** **LAB 2.** “Light bulb”: how does the speed of the magnet or coil affect the light?

**LAB 3.** “Generator”: describe how each of the following factors influences the magnitude of the deflection:

**(2 marks)**

a. strength of the magnetic field

b. speed of the magnet passing the coil (adjusted by changing the water flow)

c. the number of loops

d. the loop area

(1 mark) **LAB 4.** Explain why the generator effect would occur in the same way if the wire were moved rather than the magnet.

(2 marks) **LAB 5.** Summarize the factors that determine the magnitude and direction of the induced current when there is relative motion between a magnetic field and a conductor.

(2 marks) **LAB 6.** Describe the change in the direction (sign) of the voltage as the magnet spins. Note that this “flip” in direction does not happen with a battery (direct current, or DC, voltage source). This generator, therefore, is not generating direct current! It is an AC (alternating current) generator.

**(4 marks)** **D 3.** In the space below, include your final response (based on review of other students' work and their feedback to you) and comment on the other students' answers.

## DISCUSSION SCORING GUIDE

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